T-33-07

MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

TP3015

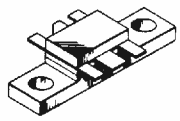
The RF Line
UHF Power Transistor

2

The TP3015 is designed for 900 MHz mobile stations in both analog and digital applications. It incorporates high value emitter ballast resistors, gold metallizations and offers a high degree of reliability and ruggedness.

- Specified 12.5 Volts, 915 MHz Characteristics
  - Output Power = 18 Watts
  - Minimum Gain = 7.5 dB
  - Class AB
  - I_Q = 100 mA

18 W–915 MHz UHF POWER TRANSISTOR NPN SILICON



CASE 319-06, STYLE 2

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	17	Vdc
Collector-Base Voltage	V_{CBO}	30	Vdc
Emitter-Base Voltage	V_{EBO}	4.0	Vdc
Collector-Current — Continuous	I_C	6.0	Adc
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	70 0.7	Watts W/°C
Storage Temperature Range	T_{stg}	−65 to +150	°C
Operating Junction Temperature	T_J	200	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	2.5	°C/W

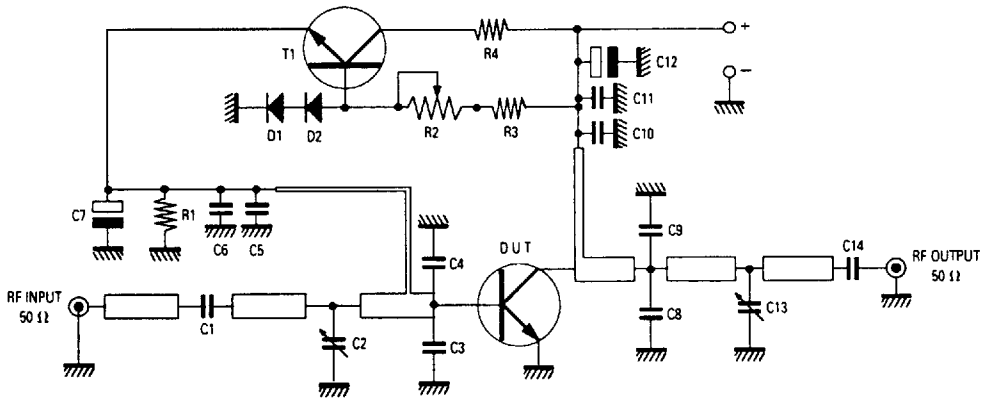
ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 50 mA, I_B = 0)	$V_{(BR)CEO}$	17	—	—	Vdc
Emitter-Base Breakdown Voltage (I_C = 6.0 mAdc)	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector-Base Breakdown Voltage (I_E = 50 mAdc)	$V_{(BR)CBO}$	30	—	—	Vdc
Collector-Emitter Leakage (V_{CE} = 17 V, R_{BE} = 75 Ω)	I_{CER}	—	—	10	mA

(continued)

ELECTRICAL CHARACTERISTICS — continued (T_C = 25 C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS					
DC Current Gain (I_C = 1 0 Adc, V_{CE} = 5.0 Vdc)	h_{FE}	15	—	135	—
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 12 V, I_E = 0, f = 1 0 MHz)	C_{ob}	—	—	30	pF
FUNCTIONAL TESTS					
Common-Emitter Amplifier Power Gain (V_{CC} = 12 5 V, P_{out} = 18 W, I_{CQ} = 100 mA) (f = 915 MHz)	G_p	7 5	8 6	—	dB
Load Mismatch (V_{CC} = 12 5 V, P_{out} = 18 W, I_{CQ} = 100 mA) (VSWR 10·1 at all Phase Angles)	ψ	No degradation in Output Power			
Collector Efficiency (V_{CC} = 12 5 V, P_{out} = 18 W, f = 915 MHz)	η_c	50	55	—	%



C2, C13 — Variable Capacitor 0 4 4 0 pF HQ
C3, C4 — Capacitor Chip 15 pF HQ
C8, C9 — Capacitor Chip 10 pF HQ
C1, C5, C10, C14 — Capacitor Chip 0805 330 pF 5%
C6, C11 — Capacitor Chip 0805 15 nF 5%
C7, C12 — Capacitor Chip 0805 6.0, 8 0 μF 35 V
R1 — Chip Resistor 51 Ω 1206 5%
R2 — Trimmer Resistor 1 0 kΩ
R3 — Chip Resistor 470 Ω 0805 5%
R4 — Power Resistor 51 Ω 3 0 W
T1 — BD135
D1, D2 — 1N4148 Diode
Board Material — 0 5 mm, Teflon Glass, Cu Clad 2 Sides, 35 μm Thick

Figure 1. Test Circuit

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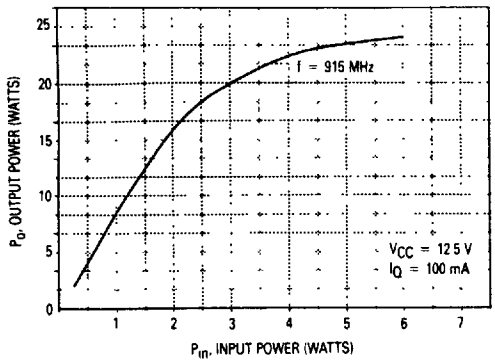


Figure 2. Output Power versus Input Power

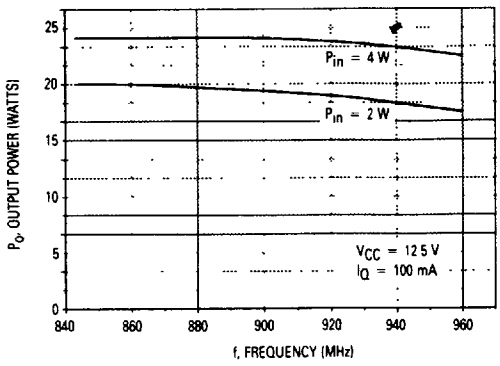


Figure 3. Output Power versus Frequency

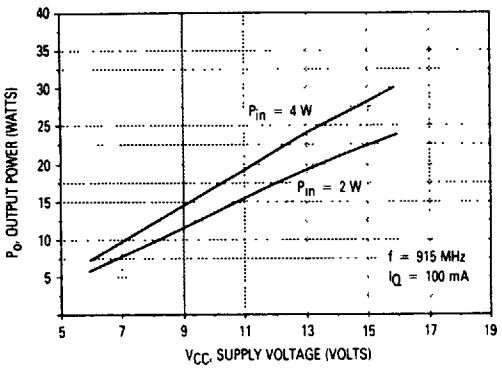


Figure 4. Output Power versus Supply Voltage

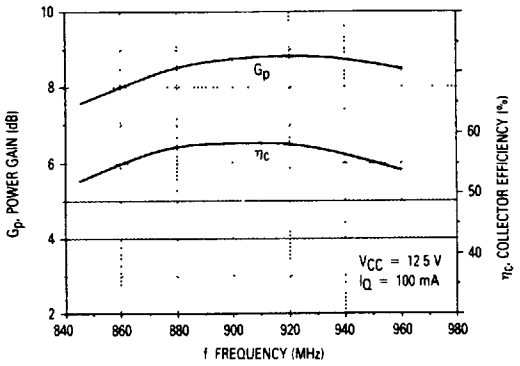
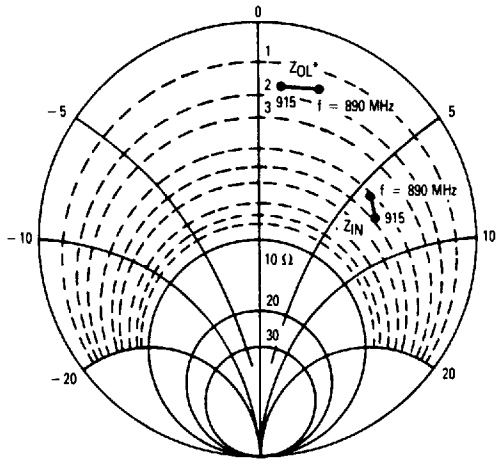


Figure 5. Typical Broadband Circuit Performance



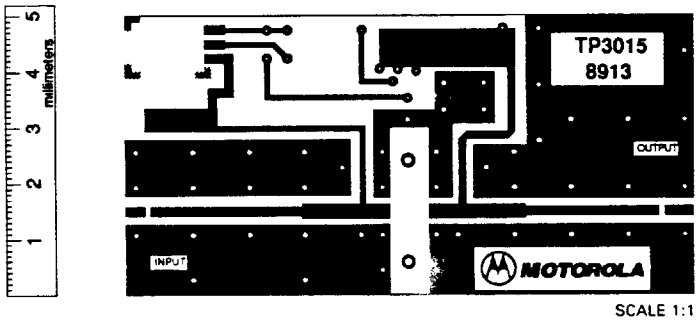
P_{out} = 18 W V_{CE} = 12.5 V

f MHz	Z_{IN} OHMS	Z_{OL}* OHMS
890	4.5 + j5.6	1.4 + j2.1
900	4.8 + j5.7	1.4 + j1.5
915	5 + j5.8	1.43 + j1.4

Z_{OL}* = Conjugate of the optimum load impedance into which the device operates at a given output power, voltage, and frequency

Figure 6. Series Equivalent Input/Output Impedances

TEFLON GLASS 0.5 mm - Double side 35µm Cu.



SCALE 1:1

Figure 7. Test Circuit — Photomaster

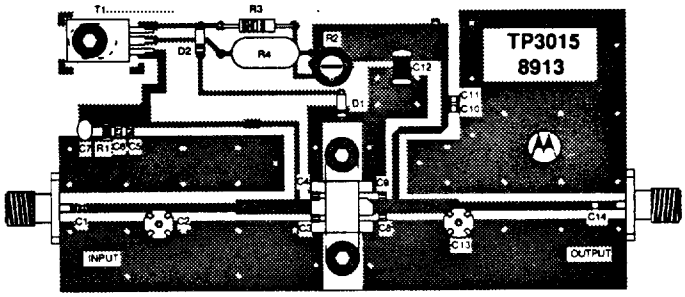


Figure 8. Test Fixture — Component Locations